

AN UPPER MIOCENE FOSSIL LOCALITY IN NORTH FLORIDA

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INTERPRETING the geology of Florida is difficult under the best available conditions. None of the continuous, clearly exposed, vertical sections, so typical of many western states, are present in the relatively flat topography of the State. Stream beds and banks, springheads, and road cuts offer some exposures useful in determining the surface geology of north Florida. However, road cut exposures are generally meager and are usually separated from other outcrops by miles of grassed over land. Close age correlations between several widely separated outcrops are never wholly satisfactory. Age determinations, based largely on lithology, are less than accurate when a fine age limit is desired. Rarely are fossils encountered, of a quantity or quality sufficient to be used as an index in dating the outcrops.

In the fall of 1961, William Yon, geologist with the Florida Geological Survey, was engaged in a field survey of Jefferson County in north Florida (Fig. 1), which will result in a report of the geology of Jefferson County to be published by the Florida Geological Survey.

While mapping an exposed section of a road cut on State Highway 146, located in the SE. corner of sec. 1, T. 2 N., R. 6 E., Yon encountered a fragment of fossil bone in a unit that had been assigned to the Miocene on evidence other than paleontological. The vertebrate fossil locality has been assigned the locality number Jf SE/SE-1-102-6.

A translucent thin section was prepared from the specimen of bone. It was determined that although this fossil scrap represented a mammal it was not of sufficient quality to go beyond this general classification.

In August 1963, Mr. Charles Sever, geophysicist with the Ground Water Branch of the U.S. Geological Survey, collected an upper molar of the Miocene horse, *Merychippus* sp. (Fig. 2, G-H, V-6062) from the same locality. Subsequent trips by Yon, Sever, and the writer resulted in the collection of additional *Merychippus* teeth, and a well preserved second lower molar of the rhinoceros, *Diceratherium* sp. (Fig. 2, K-L, V-6065). This animal is known else-

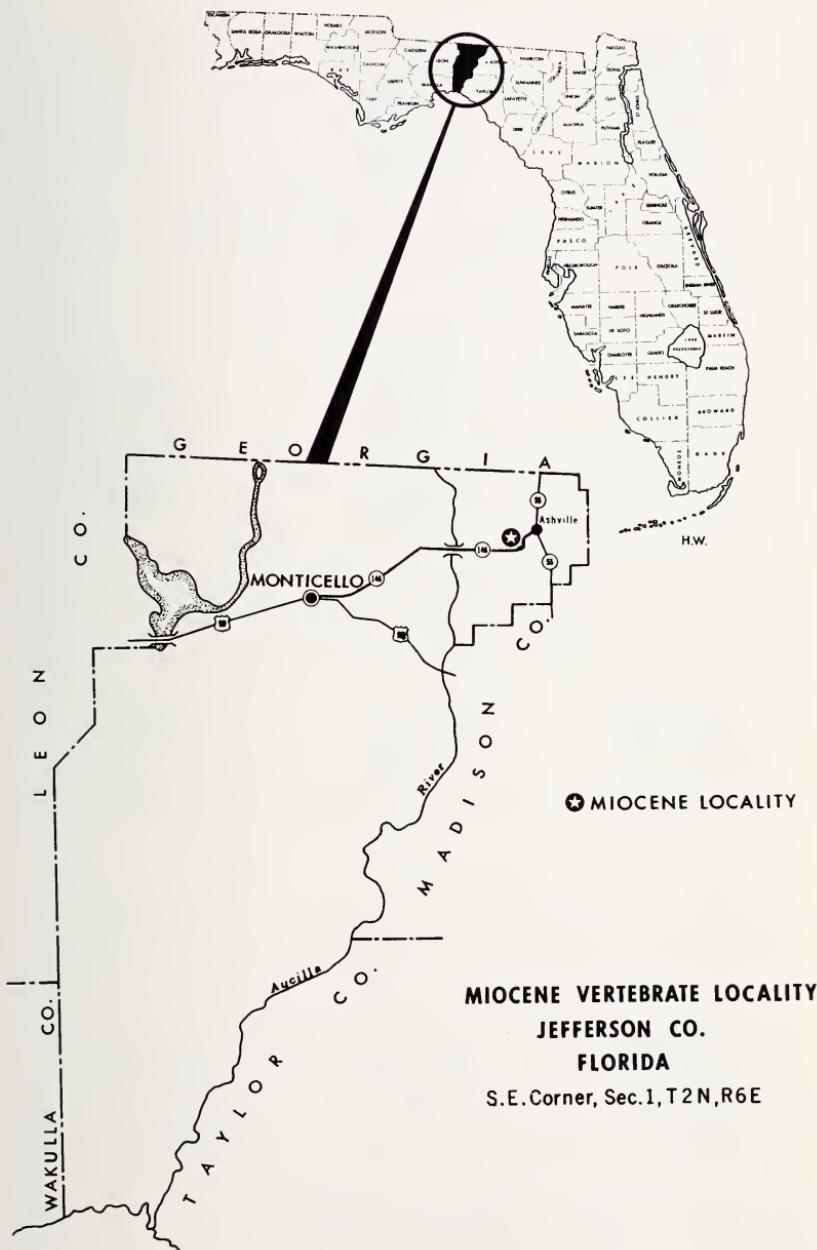


Fig. 1. Location of Miocene locality in northeastern Jefferson County, Florida.

where in the coastal plain from deposits of late Middle Miocene age (Quinn, 1955). Also collected were numerous incomplete post-cranial elements of *Merychippus*. Some large and small artiodactyl tarsal bones are present in unit B, having probably weathered out of the overlying unit C (Fig. 3), but are too fragmentary to be assigned to other than a general taxonomic category.

All of the fossils recovered were disarticulated and fragmentary. Much of the bone presents a weathered and crushed appearance. The condition of the terrestrial vertebrate remains suggest that they were perhaps carried offshore by current action and subsequently sank near the margin of a shallow bay or estuary. Certainly the presence of shark and ray teeth (gen. et sp. indet.) in the same deposit seems to bear out this hypothesis. Some previous workers have suggested a Miocene shoreline in the vicinity of the road cut (Cooke, 1945; Puri and Vernon, 1959). T. E. White (1942) and others believe that the Central Florida Dome was cut off from the mainland by the Okefenokee Trough, inundating the Jefferson County locality, to form an island to the south. The mixture of terrestrial and marine vertebrate remains would be the same in either case, with shallow waters covering an area adjacent to a flat coastal plain, where the bones and teeth of grazing land animals could easily become mixed with those of the shallow-water dwellers.

Yon's (personal communication, October 30, 1963) description of the unit (Fig. 3) in which the vertebrate remains occur is as follows:

"The vertebrate remains occur in Unit C, which is mottled yellow-brown and light gray-green, clayey, angular to subrounded, fine to very coarse grained quartz sand; contains some pea-size and larger quartz pebbles, blebs of yellow-brown clay and light gray clay granules; contact with the underlying clay unit B fairly sharp. Unit C upon exposure to weathering becomes sufficiently lithified to form a small wall along the side of the road cut. On the west end

Fig. 2. Upper Miocene mammal teeth from the Jefferson County road cut.

A-J. *Merychippus* sp.: A, occlusal view; B, labial view of rt. M^1 , V-6056; C, occlusal view; D, labial view of rt. M^1 , V-6059; E, occlusal view; F, labial view of left P^1 , V-6057; G, occlusal view; H, labial view of rt. M^3 , V-6062; I, occlusal view; J, labial view of left M_1 , V-6058.

K-L. *Diceratherium* sp.: K, occlusal view; L, lingual view of rt. M_2 , V-6065.



A

0 20 mm



C

0 20 mm



E

0 20 mm



B

0 20 mm



D

0 20 mm



F

0 20 mm



G

0 20 mm



I

0 20 mm



K

0 20 mm



H

0 20 mm



J

0 20 mm



L

0 20 mm

I. dunaway photo

of the outcrop, the unit thickens and remains resistant to weathering. The thickness of Unit C is approximately 2 feet."

The occurrence of the remains of the small, three-toed horse *Merychippus* has considerable stratigraphic importance. This animal occurs widely in deposits ranging from the beginning of the Middle Miocene to the end of the Upper Miocene. It was contemporaneous in the Middle Miocene with the more commonly known horse *Parahippus*, which became extinct before the close of the Miocene (Simpson, 1951; Stirton, 1959). The teeth of the two forms generally differ in that *Parahippus* was a browsing form with low-crowned molars, having no cement; whereas *Merychippus* was a grazing animal having high-crowned molars, with cement being present in the teeth. Isolated postcranial elements of these similar genera are not separable.

The Jefferson County horse teeth, some 30 in number, were compared with a large series of Tertiary horses from the western United States. They agree most closely with *Merychippus* from pre-Valentine (Lower Pliocene) and post-lower Snake Creek (Upper Miocene) beds but are too fragmentary for more than a generic determination. To place a specific name on these isolated teeth would do little but confuse the already complicated taxonomy of Miocene horses.

It is difficult to isolate separate molars so that they fit into the existing concept of Miocene merychippines. This is due, in part, to different specific names being assigned to individual teeth that represent stages of wear from deciduous molars to those of old individuals in the last phase of wear.

The use of a separate protocone is not a reliable feature as a valid diagnostic character for the more advanced Miocene horses. The appearance of an isolated protocone depends a great deal on degree of tooth wear. An unworn molar may have a separate protocone, but continued wear would tend to join the pattern near the base of the tooth, where the protocone is in direct contact with other infoldings of the tooth crown pattern. This was observed in the teeth of Miocene horses in the American Museum.

A new species, *Merychippus gunteri*, was described by Simpson (1930) from a fullers earth pit of lower Middle Miocene age at Midway, Florida, some 50 miles to the west of the Jefferson County locality. In the same paper, Simpson also recorded an-

other species, *M. westoni*, from the Middle Miocene of Newberry, Florida, 85 miles to the south of the locality under discussion. The *Merychippus* teeth from Jefferson County do not belong to either of these two species.



Fig. 3. Section of road cut at Miocene locality, Jf SE/SE-1-102-6. Vertebrate remains occur in unit C. Fossils have also been recovered from weathered slope overlying unit B. Field notebook for scale.

The single molar of *Diceratherium* sp. is larger and more advanced than the compared series of this genus from the western Middle Miocene. This would be expected in an animal from a slightly higher horizon.

Work is continuing at this site, and it is hoped that additional vertebrate material will be recovered, to aid in our interpretation of the stratigraphy of north Florida.

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